CSc Practical Worksheet 1(Solution)

A'S

Paper 1

Topic: Communication

1. Telephone calls can be made by using:

   - conventional telephones (using the Public Service Telephone Network (PSTN) system) over a wired network
   - a computer, equipped with speakers and microphone, connected to the Internet

Put a tick (✓) in the correct column to match each description to the appropriate communication method.

Description	Conventional telephone using PSTN	Internet-based system
connection only in use whilst sound is being transmitted		**Y**
dedicated channel used between two points for the duration of the call	**Y**	
connection maintained throughout the telephone call	**Y**	
encoding schemes and compression technology used		**Y**
lines remain active even during a power outage	**Y**	

[5]

(b) Distinguish between the Internet and the World Wide Web (WWW).

Internet
• massive network of networks/interconnected network of computer devices
• Internet stands for Interconnected Networks
• uses TCP/IP protocol

World Wide Web (www)
• is a collection of (multimedia) web pages/documents
• stored on websites
• http/protocols used to transmit data
• web pages are written in HTML
• URLs specify the location of the web pages

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- **web documents are accessed using browsers** [3]

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(c) Name the hardware device that is being described:

(i) A device that transfers data from one network to another in an intelligent way. It has the task of forwarding data packets to their destination by the most efficient route.

Router

(ii) A device used between two dissimilar LANs. The device is required to convert data packets from one protocol to another.

Gateway

(iii) A device or software that provides a specific function for computers using a network. The most common examples handle printing, file storage and the delivery of web pages.

Server

2. Access to World Wide Web content uses IP addressing.

(a) State what IP stands for.

Internet Protocol

(b) The following table shows four possible IP addresses.

Indicate for each IP address whether it is valid or invalid and give a reason.

Address	Denary / Hexadecimal	Valid or Invalid	Reason
3.2A.6AA.BBBB	Hexadecimal	Invalid	**One** point from: • This is more than 32 bits • 6AA /BBBB in Hex is bigger than FF / 255 in denary • 6AA / BBBB uses more than 8 bits / a byte • The third / fourth group is bigger than FF / 255 in denary • The third / fourth group uses more than 8 bits / a byte
2.0.255.1	Denary	Valid	There are 4 bytes, each 255 or below // All the values are in the range 0 - 255
6.0.257.6	Denary	Invalid	257 is above 255 // The third group is above 255
0A.78.F4.J8	Hexadecimal	Invalid	J is not a valid hexadecimal digit // J8 is not a valid Hex number

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(c) Describe **two** differences between public and private IP addresses.

- Public address can be reached across the Internet.
- Private address can only be reached internally/through the LAN/Intranet // private address cannot be reached across the Internet.
- NAT (Network Address Translation) is necessary for a private IP address to access the Internet directly.
- A private address is more secure than a public address // A public address is less secure than a private address.

3. Explain the difference between the World Wide Web (WWW) and the Internet.

WWW is a collection of interlinked, hypertext documents/webpages/multimedia resources (accessed via the Internet) //WWW is content from web servers organised as web pages
• Internet is the global connection of interconnected computer networks
• The Internet uses TCP/IP protocol / WWW uses http protocols to transmit data

(b) Three methods of connecting devices include fibre-optic cables, copper cables and radio waves. The table below gives descriptions relating to these connection methods.

Tick (✓) one box on each row to show the method that best fits each description.

Description	Fibre-Optic cables	Copper cables	Radio waves
'Wireless' media			✓
Twisted-pair is an example		✓	
Uses light waves	✓		
WiFi			✓
Fastest transmission media	✓		

[5]

(c) Bit streaming is used for both real-time and on-demand services.

Describe **one** difference between real-time and on-demand bit streaming.

- Real-time - a live stream of an event that is currently taking place
- On-demand - streaming of an event/programme that has taken place in the past

- Real time – the event is captured live with a video camera connected to a computer
- On-demand – Existing media are encoded to bit streaming format and uploaded to a server

- Real-time – cannot be paused / rewound etc
- On-demand – can be paused / re-wound / fast forwarded etc

(d) A device needs an IP address to connect to the Internet. IPv4 is the more common type of IP address.

Describe, using an example, the format of an IPv4 address.

- Four numbers separated with '.'
- Each number is between 0 and 255 / 00 and FF in Hex / stored in one byte.
- 32 bits long
- Correct example

4. Find out the following IP address and define their classes. Based on the classes show their total number of blocks needed:
    a. 252.192.168.32
    b. 42.16.2.1
    c. 11011110.01010000.00011110.00000111

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